

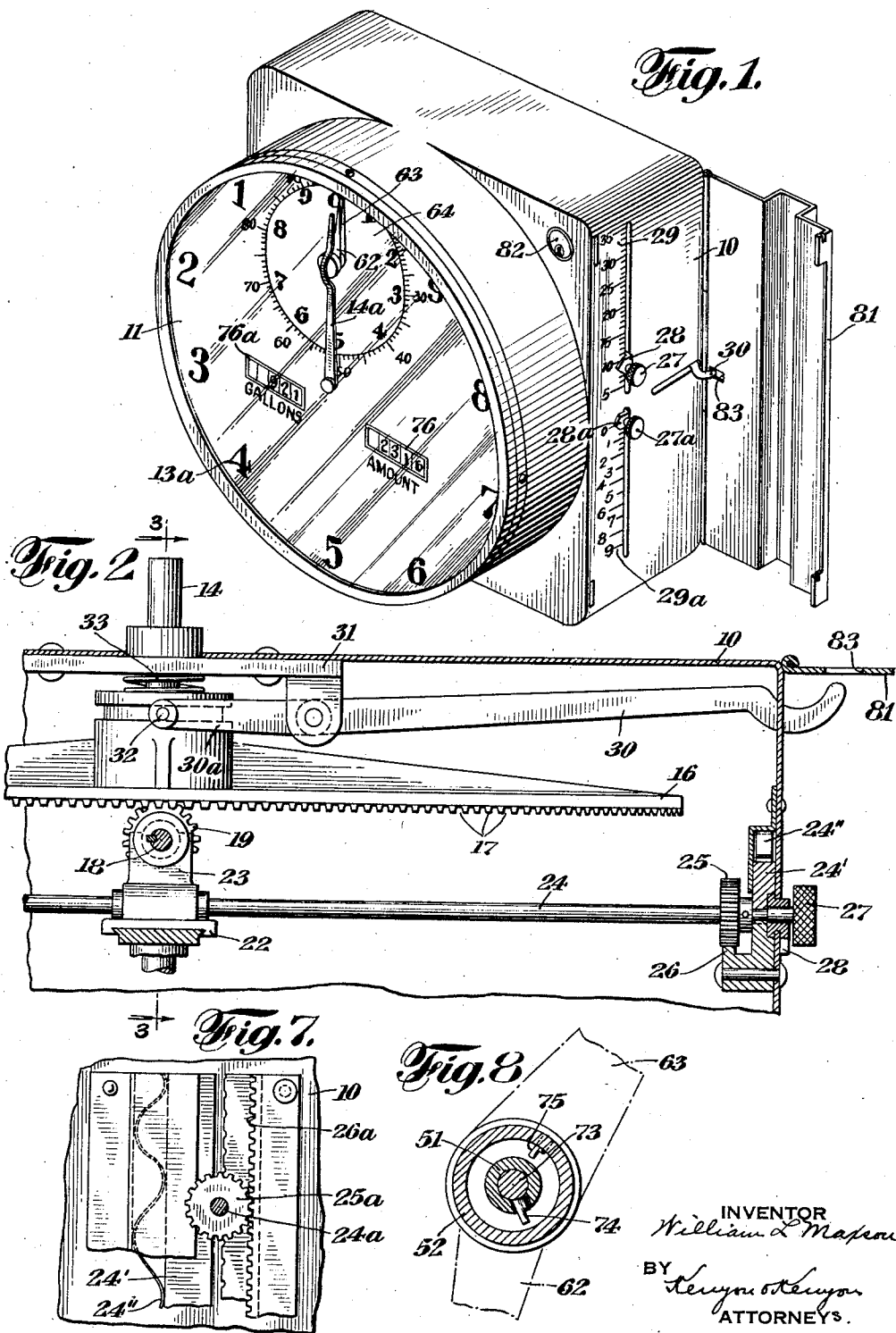
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W. L. MAXSON

2,145,843

COMPUTING MECHANISM

Original Filed March 16, 1932 4 Sheets-Sheet 1



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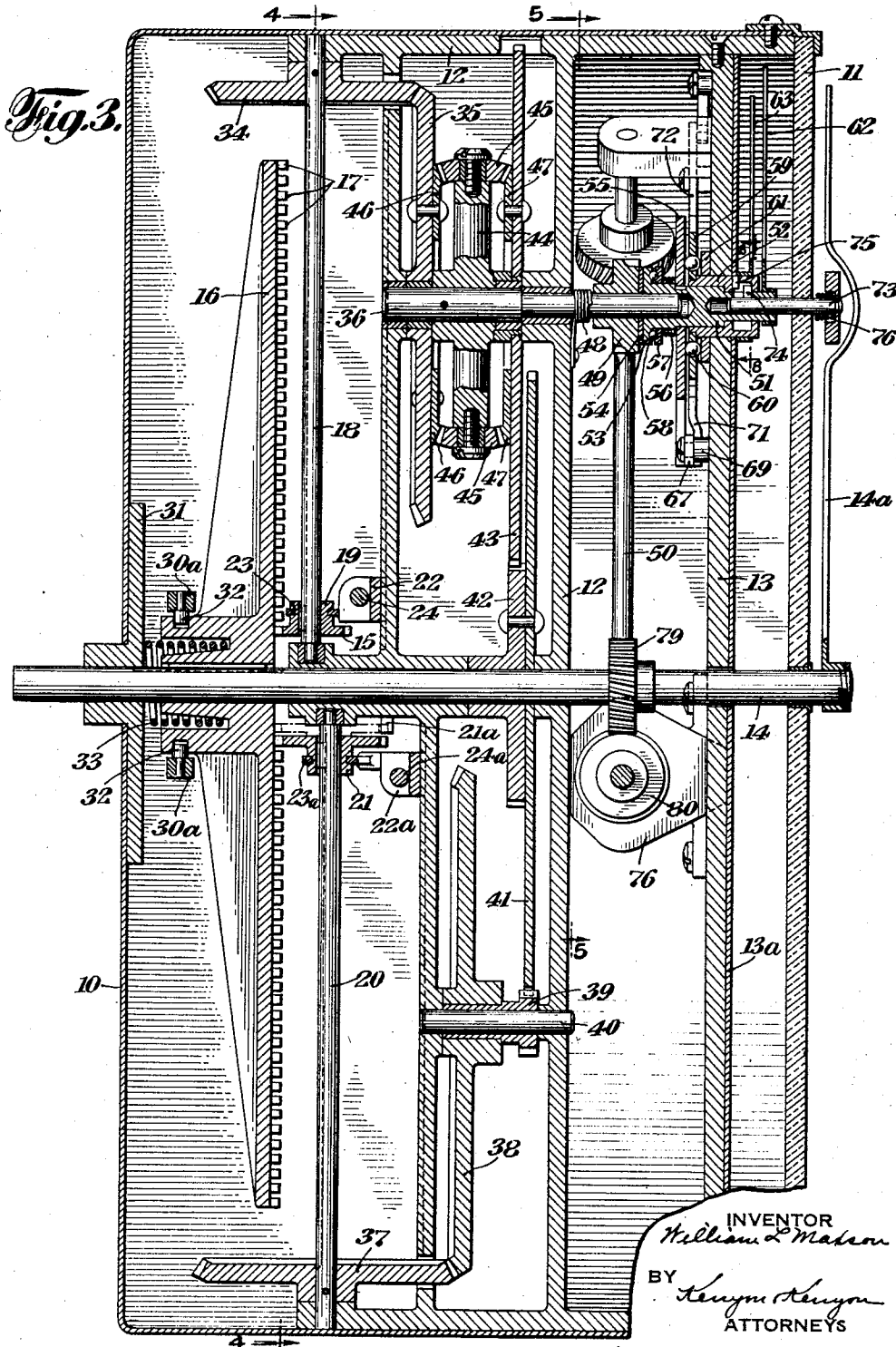
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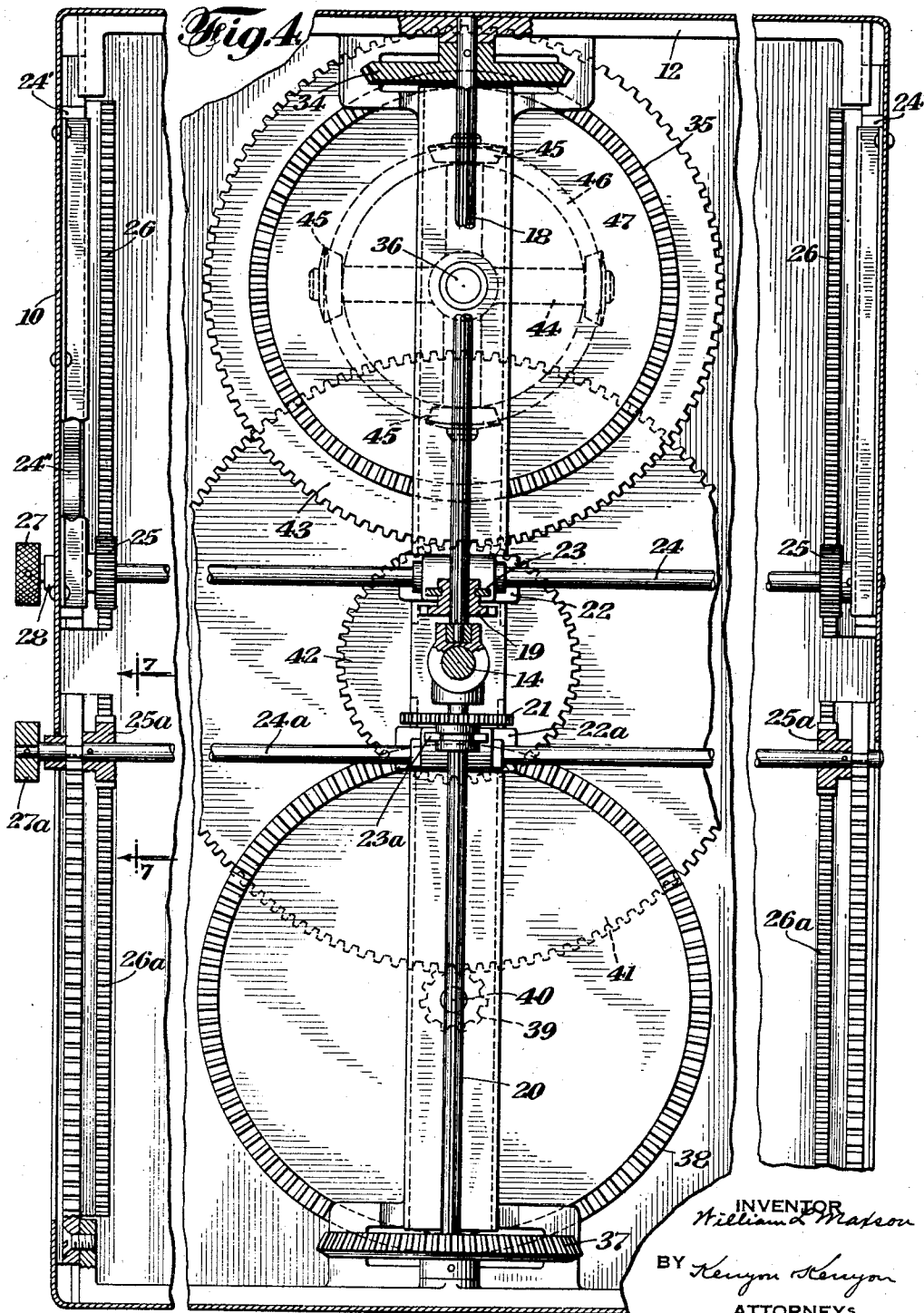
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Fig. 5.

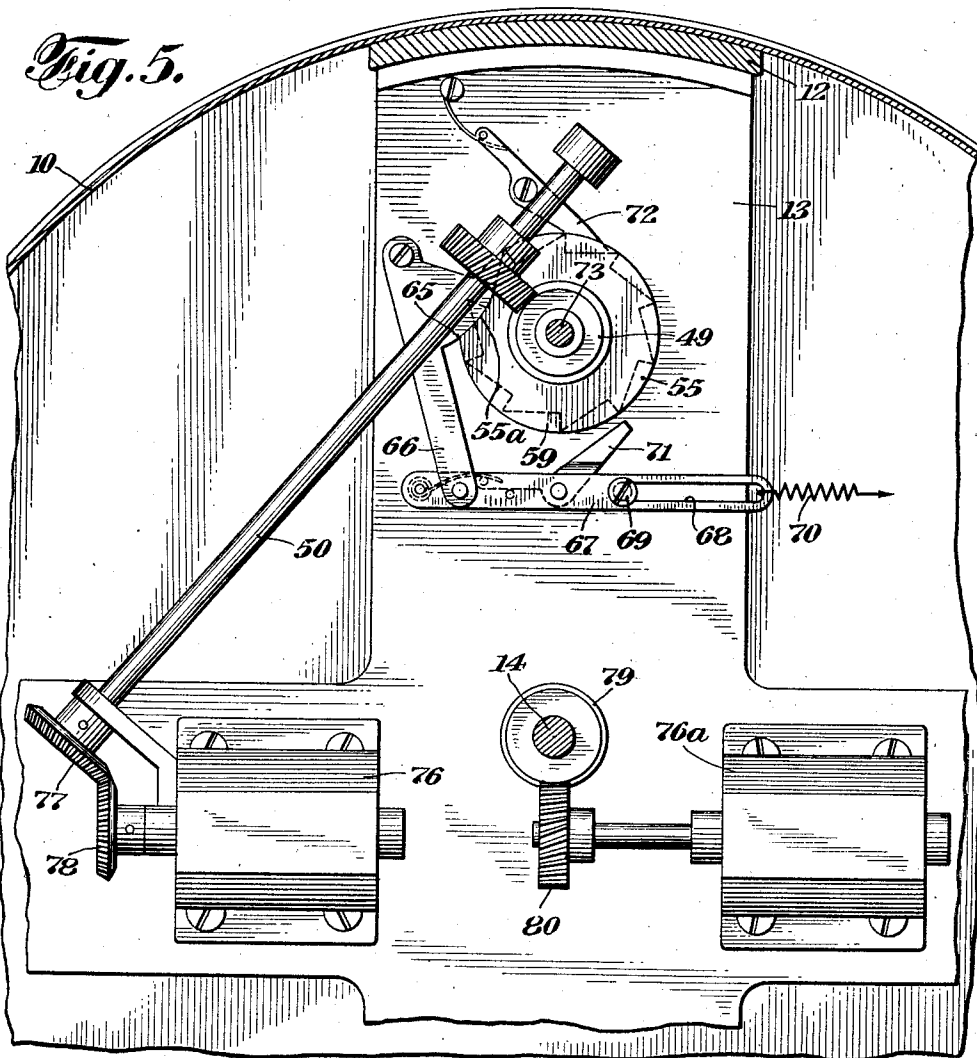
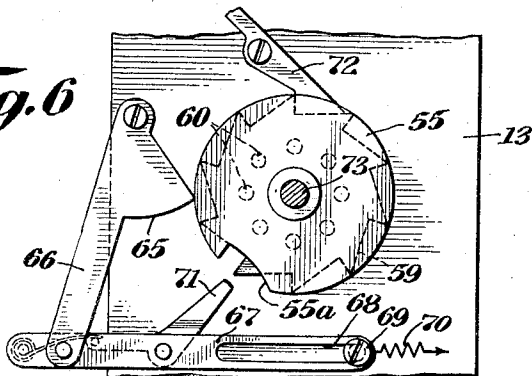


Fig. 6



INVENTOR
William L. Maxson
BY
Kenyon Kenyon
ATTORNEYS.

UNITED STATES PATENT OFFICE

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COMPUTING MECHANISM

William L. Maxson, Norfolk, Va.

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22 Claims. (Cl. 74—283)

This invention relates to computing devices.

An object of this invention is a computing device for use in connection with a dispensing apparatus and having provision for registering both the number of units of the commodity dispensed in a single operation of the dispensing device and the monetary value of the dispensed units at any given whole or mixed number price per unit in a predetermined schedule.

A further object of the invention is the provision in such computing device of means to register the total number of units dispensed by the apparatus for a period of operation and also the total value of the dispensed commodity.

A computing device of this character is of particular utility in connection with apparatus for dispensing gasoline as the per gallon price of gasoline is often a mixed number and changes frequently and the specific embodiment described herein is adapted for use with gasoline pumps. Means are provided for adjusting the computing device to work on different unit prices without in any way interfering with the means for registering the total amount of the commodity already dispensed and the value of the same.

Other objects, novel features and advantages of this invention will be apparent from the following specification and accompanying drawings, wherein:

Fig. 1 is a perspective view of a device embodying the invention.

Fig. 2 is a fragmentary horizontal section through the device.

Fig. 3 is a section on the line 3—3 of Fig. 2;

Fig. 4 is a section on the line 4—4 of Fig. 3;

Fig. 5 is an enlarged fragmentary view on the line 5—5 of Fig. 3;

Fig. 6 is a view similar to Fig. 5 with the elements in different position;

Fig. 7 is a fragmentary section on the line 7—7 of Fig. 4, and

Fig. 8 is a fragmentary section on the line 8—8 of Fig. 3.

The computing device is housed within a casing 10 having a transparent front cover 11. Within the casing there is provided a frame 12 having a wall 13 in proximity to the transparent cover 11. A shaft 14 is journaled in the frame 12 and has its ends extending through the rear wall of the housing 10 and the cover 11. This shaft is adapted to be connected by any suitable means to a rotating portion of a dispensing apparatus in such manner that the extent of rotation of the shaft is proportional to the amount of the commodity dispensed. In the present in-

stance, it is assumed that the shaft 14 is connected with a gasoline pump in such manner that it makes one complete revolution for each ten gallons of gasoline dispensed. A dial 13a is supported by the wall 13 and is visible through the cover 11, this dial being provided with equally spaced numbers indicating gallons of gasoline. A pointer 14a is frictionally mounted on the shaft 14 and cooperates with the numbers to indicate the number of gallons of gasoline dispensed in any one operation of the device. This pointer may be re-set to zero merely by rotating the same on the shaft 14.

A circular plate 16 is slidably keyed to the shaft 14. This plate is provided with a plurality of concentric annular rows of teeth 17. The number of rows may be varied to meet the conditions of operation of the device, but in the present embodiment there are 33 rows. The inner row has twenty-four teeth and each succeeding row has six more teeth, so that the outer row contains 216 teeth.

A shaft 18 is journaled in bearings in the frame 12 and extends radially of the shaft 14. A pinion 19 is slidably keyed to the shaft 18. A second shaft 20 is journaled in the frame 12 and extends radially of the shaft 14 and a pinion 21 is slidably keyed to this shaft. Pinion 19 is provided with 15 teeth and the pin 21 has 24 teeth.

A slide 22 is provided with a yoke 23 which is received in an annular groove on the hub of the pinion 19. The slide 22 is guided by a vertical portion of the frame 12 to slide parallel to the shaft 18 and is mounted on a rod 24 provided near its ends with pinions 25 which mesh with racks 26 attached to the side walls of the casing. One end of the rod 24 projects through a slot in the casing and is provided with a knurled button 27 by means of which the rod 24 may be rotated to effect vertical movement of the slide 22 and thus bring the pinion 19 into operative relation to any one of the rows of teeth 17. An indicator 28 is carried by the rod 24 to coact with a scale 29 to indicate the position of the pinion 19 with respect to the rows of teeth. A similar slide 22a has a yoke 23a operatively related to the pinion 21. This slide is mounted on a rod 24a having pinions 25a near its ends which mesh with racks 26a and is provided with a knurled button 27a and an indicator 28a co-operating with a scale 29a. Vertical bars 24' are pressed against the rod 24 and 24a by springs 24''. The racks 26 and 26a are provided with notches in which the rods 24 and 24a seat when the pinions 19 and 21 are in alignment with the

row of teeth corresponding to the notch and to the scale indication. This arrangement serves accurately to locate the pinions.

A lever 30 is fulcrumed to a plate 31 carried by the rear wall of the casing and serves as one of the journals for the shaft 14. One end of this lever extends through a side wall of the casing and at its other end is provided with a yoke 30a having pins 32 projecting into a groove in the hub of the plate 16. A spring 33 has one end arranged in a recess in the hub and the other end bearing against the plate 31.

When it is desired to change the position of the pinions 19 and 21 with respect to the rows of teeth on the plate 16, the lever 30 is actuated to move the plate away from the pinions, whereupon the rods 24 and 24a are rotated to move the pinions into the new position. The lever 30 is then released, allowing the spring 33 to move the plate toward the pinions to bring the selected rows of teeth into mesh therewith.

A gear 34 is keyed to the shaft 18 and meshes with a gear 35 rotatably mounted on a shaft 36 journaled in the frame 12. The gear 34 has a 1 to 2 ratio to the gear 35. A pinion 37 is keyed to the shaft 20 and meshes with a gear 38 fixed on the hub of a pinion 39 journaled on a shaft 40 supported by the frame 12. The pinion 39 meshes with a gear 41 carried by a pinion 42 which is journaled on the shaft 14. The pinion 42 meshes with a gear 43 which is journaled on the shaft 36. The ratio between the gear 37 and the gear 43 is 1 to 50. The shaft 36 has a spider 44 fixed thereto and on the spider are journaled pinions 45 which mesh with ring gears 46 and 47 mounted on the gears 35 and 43, respectively.

A wire helix 48 surrounds the shaft 36 and has one end fixed to the frame 12. This helix acts as a one-way brake to prevent rotation of the shaft 36 in one direction. A spiral pinion 49 is keyed to the shaft 36 and meshes with a spiral gear on a shaft 50. The shaft 36 projects slightly beyond the pinion 49 and extends into a recess in a stub shaft 51 which is rotatably supported in a sleeve 52 journaled in the wall 13. The stub shaft 51 has a flange 53 between which and the pinion 49 there is provided a friction disk 54. A wheel 55 is fixed to the shaft 51 and a spring 56 is provided between the wheel 55 and an annular plate 57 surrounding the shaft 51 and having a ball-race in which are arranged anti-friction balls 58 which also run in a race-way in the flange 53. A ratchet wheel 59 is rigidly connected to the sleeve 52 and is provided with an annular row of apertures in which are mounted anti-friction balls 60 which engage the wheel 55 and also a bearing plate 61 surrounding the sleeve. The stub shaft 51 and the sleeve 52 carry pointers 62 and 63 and on the dial 13a there is provided a smaller dial 64 with which the pointers cooperate to indicate the value of the commodity dispensed. This dial is provided with numbers 1 to 9 representing dollars and with intermediate indicia representing cents. The pointer 62 registers cents while the pointer 63 registers dollars.

The wheel 55 is provided with an arcuate cut-out portion 55a which is adapted to receive an arcuate detent 65 projecting from a lever 66 fulcrumed on the frame 12. A link 67 is connected to the free end of the lever 66 and has an elongated slot 68 into which projects a pin 69 extending from the frame 12. A spring 70 exerts force on the link tending to draw the lever 66

toward the wheel 55. In the position of rest of the apparatus, the pointers 62 and 63 register with the zero mark on the dial 64 and the various elements are in the position shown in Fig. 5 with the projection 65 seated in the recess 55a. The detent 65 prevents clockwise rotation of the wheel 55 from its position of rest (Fig. 5), while permitting counter-clockwise rotation from said position which results in camming the detent out of the recess and moving the lever 66 to the left (Fig. 6). The link 67 carries a pawl 71 which is adapted to engage the teeth of the ratchet wheel 59 to effect step by step rotation thereof. A pawl 72 is provided to engage the teeth of the ratchet wheel to yieldably restrain the same against clockwise or counter-clockwise movement with the pointer 63 at zero or in register with one of the dollar numbers. A rod 73 is slidably keyed in the stub shaft 51 by means of a pin 74 which projects through a slot in the sleeve 52 and is adapted in one position of the rod 73 to engage a lug 75 carried by the sleeve 52. A spring 76 normally holds the rod 73 in such position that the pin 74 is out of register with the lug 75.

Referring now to Figs. 5 and 6, rotation is imparted to the stub shaft 51 from the pinion 49 through the friction disk 54, thus rotating the wheel 55 counter-clockwise from its position of rest. Such rotation of the wheel 55 cams the detent 65 out of the recess 55a thereby moving the lever 66 to the position shown in Fig. 6. The pointer 62 is thus moved over the dial 64. After the wheel 55 has made one complete revolution, the recess 55a comes again into alignment with the projection 65, thereby permitting the spring 70 to draw the link 67 to the right to engage the pawl 71 with a tooth of the ratchet wheel and advance the same one step. The pointer 63 is thereupon advanced one step. The dollar pointer is not moved until after the cents pointer has made one complete revolution, thereby preventing any misreading of the register. Further rotation of the shaft 52 repeats the above described action.

In order to explain the operation of the computing device assume, first, that the price of gasoline is eighteen cents. The slide 22 is so adjusted that the pinion 19 is in mesh with the fifteenth row of teeth 17, which row has 108 teeth. The pinion 21 is so arranged at the upper end of the shaft 20 that it is out of mesh with the teeth on 16 and is held against rotation by a stop 21a as shown in dot dash, Fig. 3. As the plate 16 makes one revolution representing ten gallons, the pinion 19 will make 7 and $\frac{1}{2}$ revolutions and the gear 35 will make 3 and $\frac{3}{4}$ ths revolutions. The pointer 62 will come to rest at 80 cents, while the pointer 63 will have been stepped to one dollar, thus registering \$1.80. Now, assume that the price is 18 and $\frac{2}{3}$ ths cents. The decimal is taken care of as follows: each fourth row of teeth 17 represents a tenth of a cent. The pinion 21 is, therefore, set in mesh with the fifth or 48 tooth row which represents $\frac{2}{3}$ ths of a cent. A complete revolution of the plate 16 will turn the gear 37 through two revolutions and because of the reduction gearing between the gear 37 and the gear 43, the latter will be turned $\frac{1}{25}$ th of a revolution, but in the same direction as the gear 35. Therefore, the spider 44 will be additionally advanced $\frac{1}{50}$ th of a revolution more than it would be rotated had the gear 43 remained stationary, this additional advancement being the result of the differential gearing constituted by the gears 45, 46 and 47. The pointer 62 will therefore stop 75

at 82 cents and the two pointers together will register \$1.82.

To reset the pointer 62 to zero, the rod 73 is turned and with it the wheel 55 is rotated clockwise in Figs. 5 and 6 to the position shown in Fig. 5. The shaft 36 is held against rotation by the inertia of the gear trains and also by the one-way brake 48. The friction drive between the pinion 49 and the stub shaft 51 permits rotation of the shaft relative to the pinion. The detent 65 seats in the recess 55a and stops further rotation thereof. To reset the pointer 63, the rod 73 is pushed in, before rotation to bring the pin 74 into position to engage the lug 75 and is then rotated as before. The pin 74 engages lug 75 and moves the pointer 63 along with the pointer 62. The wheel 55 and ratchet wheel 59 are thus rotated clockwise in Figs. 5 and 6. Rotation of the rod is continued until the wheel 55 is stopped as above described. The arrangement of the pin 74 and lug 75 is such that when the wheel 55 is stopped, the pointer 62 is at zero position, but the ratchet wheel 59 has been rotated clockwise beyond the position at which the pointer 63 is at zero position. The lever 66 stands in the position shown in Fig. 6 with the pawl 71 in position to engage a tooth of the ratchet wheel 59, until its release by seating of the detent 65 in the recess 55a when it will have been released, but will be held against full return movement by reason of engagement of the pawl 71 with one of the teeth of the ratchet wheel. As soon as the rod 73 is released and moved outwardly by its spring to disengage the pin 74 from the lug 75, the spring 70 draws the link 67 to the right, thereby rotating the ratchet wheel counterclockwise in Figs. 5 and 6 to zero position and fully seating the projection 65 in the recess 55a.

Registers 76 and 76a are provided to register the total number of gallons of gasoline sold and the value of the same. These registers are mounted on the rear face of the wall 13 and the totals are visible through slots in the wall. The register 76 is driven by the shaft 50 through the medium of pinions 77 and 78 carried respectively by the shaft 50 and the drive shaft of the register. This register is, therefore, actuated in synchronism with the rotation of the shaft 36. The register 76a is driven from the shaft 14 through the medium of spiral gears 79 and 80 carried respectively by the shaft 14 and the drive shaft of the register 76a. The register 76a is therefore actuated in synchronism with the shaft 14.

A cover 81 is hinged to the casing 10 and is provided for preventing unauthorized access to the knobs 27 and 27a and also the lever 30. A lock 82 is provided for locking the cover in closed position. The cover is provided with a slot 83 through which the end of the handle 30 extends when the cover is closed, the lever being held against movement by engagement of the ends of the slot. The cover is also provided with a vertical offset to receive the knobs 27 and 27a irrespective of the adjustment of these knobs. When it is desired to change the setting of the apparatus, the cover 81 is swung open, thus giving free access to the knobs 27 and 27a and permitting operation of the lever 30.

It is of course understood that various modifications may be made in the structure above described without in any way departing from the spirit of the invention as defined in the appended claims.

I claim:

1. In a computing mechanism, a rotatable

member having a plurality of concentric rows of teeth, two shafts arranged radially of said member, pinions slidably mounted on said shafts for selective engagement with said rows of teeth, a third shaft having two gears rotatably mounted thereon in spaced relation, different ratio driving connections between said pinions and said gears, for rotating the latter in the same direction at different rates than the first gear, a spider fixed to said third shaft between said gears, and a pinion supported by said spider, said pinion being in mesh with both of said gears.

2. In a computing mechanism, a rotatable member having a plurality of concentric rows of teeth, two shafts arranged radially of said member, pinions slidably mounted on said shafts for engagement with selected rows of teeth, means to vary the positions of said pinions axially of their shafts, a third shaft having two gears rotatably mounted thereon in spaced relation, different ratio driving connections between said pinions and said gears for rotating the latter in the same direction at different rates than the first gear, a spider fixed to said third shaft between said gears, and a pinion supported by said spider, said pinion being in mesh with both of said gears.

3. In a computing mechanism, a rotatable member having a plurality of concentric rows of teeth, two shafts arranged radially of said member, pinions slidably mounted on said shafts for engagement with selected rows of teeth, means for varying the positions of said pinions axially of said shafts, a third shaft, two gears rotatably mounted thereon in spaced relation, different ratio driving connections between said pinions and gears for rotating the latter in the same direction at different rates, a spider fixed to said third shaft between said gears and a pinion carried by said spider in mesh with both of said gears.

4. In a computing mechanism, a rotatable member having a plurality of concentric rows of teeth, two shafts arranged radially of said member, pinions slidably mounted on said shafts for engagement with selected rows of teeth, means for varying the positions of said pinions axially of said shafts, a third shaft, two gears rotatably mounted thereon in spaced relation, driving connections of one ratio between one of said pinions and one of said gears for rotating the latter at a predetermined rate, driving connections of another ratio between the second pinion and the second gear for rotating the latter in the same direction at a lower rate than the first gear, a spider fixed to said third shaft between said gears, and a pinion carried by said spider in mesh with both of said gears.

5. In a computing mechanism a rotatable member having a plurality of concentric rows of teeth, two shafts arranged radially of said member, pinions slidably mounted on said shafts for engagement with selected rows of teeth, means for varying the positions of said pinions axially of said shaft, a third shaft, two gears rotatably mounted thereon in spaced relation, different ratio driving connections between said pinions and said gears for differentially rotating the gears in the same direction, and driving means between said gears and said third shaft reactive to differential rotation of said gears.

6. In a computing mechanism, a rotatable member having a plurality of concentric rows of teeth, two shafts arranged radially of said member, pinions slidably mounted on said shafts for selective engagement with said rows of teeth.

a third shaft, gears rotatably mounted thereon in spaced relation, different ratio driving connections between said pinions and said gears for rotating the gears in the same direction, and driving means between said gears and said third shaft reactive to differential rotation of said gears.

7. In a computing mechanism, a driving shaft, a driven shaft, rotatable members, differential gearing between said members and said driven shaft, different ratio driving means for each rotatable member selectively and independently connectable to said driving shaft for rotating each member at a predetermined ratio to said driving shaft, said means comprising a set of coplanar and concentric gear teeth carried by said driving shaft and axially movable thereon and means for locking one rotatable member.

8. In a computing mechanism, a first shaft, a second shaft, and means interposed between said first shaft and second shaft for giving two different characteristics of rotation to said second shaft, said means including a plurality of gear teeth arranged in concentric and coplanar relation, gears selectively engageable therewith, and different ratio gear means interposed between said selective gears and said second shaft.

9. In a computing mechanism, a first shaft, a second shaft, means interposed between said first shaft and second shaft for giving a selected characteristic of rotation to said second shaft, said means including a plurality of coplanar and concentric gear teeth arranged and adapted to be selectively geared to said second shaft and selectively operable means interposed between said first and second shafts for giving another selected characteristic of rotation to said second shaft, and setting means for said other means visibly indicating the selected characteristics of rotation.

10. In a computing mechanism, the combination of a first shaft, a member rotatable therewith and having a plurality of coplanar and concentric rows of teeth, a pair of shafts adjacent thereto, gear means slidably mounted on said pair of shafts for selective engagement with said rows of teeth, a fourth shaft, and different ratio gear means differentially disposed between said fourth shaft and said pair of shafts whereby rotation of said first shaft selectively variably drives said fourth shaft.

11. A computing mechanism comprising a driving shaft, a driven shaft, means interposed between said driving and driven shafts for giving two different characteristics of rotation to said driven shaft, said means including a plurality of gear teeth arranged in concentric and coplanar relation, gears selectively engageable therewith, said selective gears and said driven shaft and indicating means positively associated with each gear for identifying the gear teeth with which such gear is engaged.

12. A computing mechanism comprising a driving shaft, a driven shaft, a first means interposed between said shafts for giving a first selected characteristic of rotation to said driven shaft, a second means interposed between said shafts for giving a second selected characteristic of rotation to said driven shaft, said means including a plurality of gear teeth arranged in concentric and coplanar relation and gears adapted to be selectively engaged with said gear teeth and indicating means positively associated with each gear

for identifying the selected characteristics of rotation.

13. A computing mechanism comprising a casing containing a first shaft, a second shaft, means interposed between said first and second shafts for giving two different characteristics of rotation to said second shaft, said means including a plurality of concentric and coplanar rows of gear teeth, gears selectively engageable therewith, different ratio gear means interposed between said selective gears and said second shaft, and means operable from the exterior of said casing for selectively engaging said gears with said gear teeth.

14. A computing mechanism according to claim 13 in which indicating means are positively associated with each gear for visibly indicating the relation of said gears to said gear teeth.

15. A computing mechanism comprising a casing containing a driving shaft, a driven shaft, a first means interposed between said shafts for giving a first selected characteristic of rotation to said driven shaft, a second means interposed between said shafts for giving a second selected characteristic of rotation to said driven shaft, said means including a plurality of gear teeth arranged in concentric and coplanar relation and gears adapted to be selectively engaged with said gear teeth, and setting means operable from the exterior of said casing for selectively engaging said gears with said gear teeth.

16. A computing mechanism according to claim 15 in which indicating means are positively associated with each gear for visibly identifying the selected characteristics of rotation.

17. A computing mechanism according to claim 15 in which said setting means for each gear comprises a shaft connected thereto and having one end projecting through a slot in the casing, a pinion carried by said shaft, a rack with which said pinion engages and means on said shaft exterior of said casing for effecting rotation of said shaft.

18. A computing mechanism according to claim 15 in which said setting means for each gear comprises a shaft connected thereto and having one end projecting through a slot in the casing, a pinion carried by said shaft, a rack with which said pinion engages and means on said shaft exterior of said casing for effecting rotation of said shaft and indicating means positively associated with each gear for visibly identifying the selected characteristics of rotation.

19. A computing mechanism comprising a casing having an external planar face, a driving shaft, a driven shaft, means interposed between the shafts for giving two different characters of rotation to said driven shaft, said means including a plurality of co-axially arranged gear teeth, gears selectively engageable therewith, a splined shaft for each of said gears on which such gear is slidably movable, different ratio gear means interposed between said selective gears and said driven shaft, means whereby each of said gears may be propelled on its shaft into any selected operative position, an indicator positively associated with each gear for identifying the gear teeth with which such gear is engaged, said indicators being disposed at said planar face of said casing and visible on the exterior of said casing and means for causing each indicator to follow the movement of its corresponding gear while said gear is being propelled on its shaft into any selected position, said indicators being disposed on parallel axes so that together they con-

stitute a readily readable indication in correspondence with the ratio of rotation between the driven and the driving shafts.

20. A computing mechanism comprising a casing having an external planar face, a driving shaft, a driven shaft, means interposed between the shafts for giving two different characters of rotation to said driven shaft, said means including a plurality of co-axially arranged gear teeth, gears selectively engageable therewith, a splined shaft for each of said gears on which such gear is slidably movable, different ratio gear means interposed between said selective gears and said driven shaft, means whereby each of said gears may be propelled on its shaft into any selected operative position, an indicator positively associated with each gear for identifying the gear teeth with which such gear is engaged, said indicators being disposed at said planar face of said casing and visible on the exterior of said casing and means comprising a rack and pinion for causing each indicator to follow the movement of its corresponding gear while said gear is being propelled on its shaft into any selected position, said indicators being disposed on parallel axes so that together they constitute a readily readable indication in correspondence with the ratio of rotation between the driven and the driving shafts.

21. A computing mechanism comprising, in combination, a supporting frame having a pair of spaced apart parallel plates; a driving shaft passing through said plates; one end of said driving shaft extending outwardly from one of said plates being available to receive power, the other end of said driving shaft extending outwardly from the other of said plates being available for delivering power; a driven shaft extending through one of said plates; means located between said plates for connecting said shafts and including a plurality of sets of gear teeth connected to said driving shaft, each set having a different number of teeth; a differential gearing mechanism arranged to combine a plurality of different rates of rotation and transmit them to the driven shaft; a plurality of countershafts, different ratio gears connecting each of said

countershafts and said differential gearing mechanism for transmitting the rotation of said countershafts to said differential gearing mechanism, means adjustable along each of said countershafts and arranged to selectively connect the countershafts with said sets of gear teeth, an indicator positively connected to each of said last named adjustable means for identifying the set of gear teeth with which its countershaft is connected, said indicators being disposed closely adjacent each other and in a manner whereby together they provide a readily readable unitary indication in correspondence with the ratio of rotation between the driven and the driving shafts.

22. In a computing mechanism, the combination of a frame having a pair of spaced apart supporting members, a driving shaft passing through said members and having one end extending outwardly from one of said members and available for connection to a rotating member and having its other end extending outwardly from the other of said members, and available for connection to an indicator; a driven shaft extending through one of said supporting members; means located between said supporting members for connecting said shafts and including a plurality of sets of gear teeth connected to said driving shaft, each set having a different number of teeth, a differential gearing mechanism having a driven member connected to said driven shaft and at least two driving members, means for rotating said driving members including a plurality of countershafts and means adjustable along each of said countershafts and arranged to selectively connect the countershafts with said sets of gear teeth, and an indicator connected to each of said adjustable means for identifying the set of gear teeth with which its countershaft is connected, said indicators being disposed closely adjacent each other and in a manner whereby together they provide a readily readable integrated indication in a plane in correspondence with the ratio of rotation between the driven and the driving shafts.

WILLIAM L. MAXSON.